Trinity College, prosecuting research in the Cavendish Laboratory. He was one of the pioneers of wireless telegraphy, and occupies a high position in the scientific world owing to his experimental work on the ionisation of gases, the discovery of the radium emanation, and the foundation of the now generally accepted theory of radio-activity. It is expected that Prof. Rutherford will arrive in Manchester early in the summer with the view of taking up the regular duties of the professorship at the beginning of the session in October next.

JANUARY has again brought with it conferences of teachers of all grades in various parts of the country. In London, large numbers of schoolmasters, schoolmistresses, and educational administrators have met under the auspices of the London County Council, and discussed for three days subjects as various as silversmith's work and the teaching of phonetics. In Bradford, the educationists of the north of England have, in well-attended meetings, ranged over the field of education. Associations of teachers of special subjects have also held meetings characterised by their enthusiasm. Such gatherings are to be welcomed as maintaining an active interest in education, and as likely to send teachers back to their work with renewed energy and broader knowledge. It is worthy of note that in none of the meetings has science or mathematics taken a prominent part. We have no reason to regard this as indicative of a falling off in the interest in these important parts of the school curriculum; it rather directs attention to the fact that in recent years questions concerning mathematical and scientific teaching have dominated the programmes of teachers' meetings, and much thorough discussion has led to improved teaching and obviated, for the present, the need for further argument. At the Bradford conference an important session had for its subject the development of technical education in a large manufacturing centre. Prof. Charnock, of Bradford, and Principal Reynolds, of the Manchester Technical School, read papers. Mr. Reynolds said we need more intelligence and more knowledge on the part of our working people. He suggested, first, the need for the extension of the age-limit in higher elementary schools to sixteen years. There is an advantage in selecting in each of suitable localities of a town one of the elementary schools, and giving it an extended curriculum, staffing and equipping it accordingly, such school being fed from the elementary department of the school and from neighbouring elementary schools, and supported by a scheme of scholarships. Secondly, the enactment of a law forbidding the employment of young people in working overtime until they reached their eighteenth year, so as to give full opportunity for attending evening classes. Thirdly, the establishment of one-day courses of specialised instruction in the technical school or college for selected apprentices in engineering and other similar important industries. He urged that the present need is a better appreciation of the requirements of general and secondary education so far as to secure a longer school life, and thus a more complete preparation for specialised training.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, November 15, 1906.—"The Effect of Temperature on the Activity of Radium and its Transformation Products." By Dr. Howard L. **Bronson.** Communicated by Prof. E. Rutherford, F.R.S.

A large number of investigators have attempted to alter the activity of various radio-active substances by subjecting them to very high and also to very low temperatures. Among all these attempts only two, so far as the present author is aware, have apparently given positive results.

The experiments now described show no evidence whatever of any change in the activity of the transformation products of radium when they are subjected to temperatures between −180° C. and 1600° C. If any change does take place it is very small, and cannot be more than 1 per cent. in the case of radium C for temperatures between −180° C. and 1600° C., nor more than 1 per cent. in the case of the emanation or radium B for temperatures between −180° C. and 1500° C.

There is thus removed the only known exception to the general rule, that the activity of radio-active substances is not affected by temperature.

"The Photoelectric Fatigue of Zinc." By H. Stanley **Allen.** Communicated by Prof. H. A. Wilson, F.R.S.

Hertz's observation that ultra-violet light can facilitate the passage of an electric spark led to the discovery of other photoelectric actions. In the earliest experiments on the photoelectric effect of metals it was noticed that the action was diminished by exposure to light. Thus Hallwachs, who found that a metal becomes positively electrified under the influence of ultra-violet light, states that "old surfaces no longer show the phenomenon. The radiation itself lowers the potential to which the plates can be electrified, so that with any succeeding experiment made with the same surface, the potential obtained is lower, while the rise to it takes place more rapidly, and the decrease is greater than when for the same interval of time between the experiments the plate was not illuminated." This diminution of the photoelectric action is spoken of as the "fatigue" of metals under the influence of light, and has received attention from many physicists.

The present paper deals with the manner in which the photoelectric activity of zinc diminishes when the metal is exposed to light.

The experiments described show that it is necessary to employ the sum of two exponential terms in order to obtain an adequate representation for the photoelectric fatigue curve of zinc. Just as Rutherford has explained the curves of decay for the excited activity of radium and thorium as a consequence of successive changes, so it is possible to explain the present results as due to two consecutive changes. The nature of the modifications thus suggested is left an open question.

It is also shown that the longer waves of light can bring about a change in the opposite sense, that is to say, they can produce a certain amount of recovery of photoelectric activity.

Entomological Society, December 5, 1906.—Mr. F. Merrifield, president, in the chair.—*Exhibits.*—A. W. **Bacot**: A specimen of *Catocala nupta*, taken at rest at Hackney, November 9, 1906, remarkable for having two well-developed tarsi on the left fore-leg. Also three ♀ specimens of *Lasiocampa quercus*, L., bred from larvæ from Cornwall in 1906. One of these larvæ had been submitted to a pressure of from 11 to 30 atmospheres (405 lb. to 450 lb. per square inch) on two occasions, a pressure which had proved fatal at once to a frog, used as a control experiment.—Dr. T. A. **Chapman**: A long series of *Hastula hyerana*, Mill., bred in 1906 from larvæ collected at Hyères, illustrating the spread of melanism in this species, and a diagrammatic map of the neighbourhood to explain its distribution in that area.—Dr. F. A. **Dixey**: Specimens of *Teracolus omphale*, Godt., bred by Mr. G. A. K. Marshall, to show that under arranged conditions of moisture and warmth the wet-season phase might be artificially induced.—*Papers.*—*Xanthorhoë ferrugata*, Clerck, and the Mendelian hypothesis: L. B. **Prout.**—The diaposematic resemblance between *Huphina corva*, Wallace, and *Ixias baliensis*, Fruhst.: Dr. F. A. **Dixey.**

Chemical Society, December 20, 1906.—Prof R. Meldola, F.R.S., president, in the chair.—A new laboratory method for the preparation of hydrogen sulphide: F. R. L. **Wilson.** If a current of hydrogen sulphide is passed over calcium hydroxide a hydrosulphide is formed which can be decomposed by carbon dioxide, a carbonate being produced and hydrogen sulphide evolved.—The affinity constants of aminocarboxylic and aminosulphonic acids as determined by the aid of methyl-orange: V. H. **Veley.** It is shown that the usual mathematical expressions hold good, namely, those of straight lines, $y=kx$ or $y=kx-b$, or logarithmic curves, $\log y=\log k+x\log a$. Acids which show irregularities in the Ostwald electric conductivity expression $\phi(k)=a^2/(1-\alpha)V.(\alpha=\mu/\mu_\infty)$ likewise show similar irregularities in the methyl-orange method.—Contributions to the study of the calcium phosphates, i., the hydrates of the calcium hydrogen orthophosphates: H. **Bassett,** jun. The author's experiments show that, in all probability, dicalcium phosphate can only form one hydrate.

namely, the dihydrate.—Contributions to the study of the calcium phosphates, ii., the action of ammonia gas on the calcium hydrogen orthophosphates: H. **Bassett,** jun. —Relation between chemical constitution and physiological action in the tropeines: H. A. D. **Jowett** and F. L. **Pyman.** The authors conclude that Ladenburg's generalisation, which asserts that mydriatic tropeines must possess a benzene nucleus and a fatty hydroxyl in the side chain, cannot be maintained, since it does not hold good in the cases of terebyltropeine or the lactone of *o*-carboxyphenylglyceryltropeine.—Some derivatives of salicylic acid: H. A. D. **Jowett** and F. L. **Pyman.** Descriptions of cinnamoylsalicylic acid, its methyl and ethyl esters, and quinine salt, and also 3:5-dichloroacetylsalicylic acid, are given.—The addition of bromine to cinnamic acid and its esters. Preliminary notice: J. J. **Sudborough** and J. **Thomas.** An account of experiments made to determine the velocity of formation of the bromides of this acid and certain of its derivatives is given.—The optical and magneto-optical influence of ethenoid linkings attached to contiguous carbon atoms: J. W. **Brühl.** It has been shown by Sir W. H. Perkin that limonene, dipentene, and $\Delta^{3:8(9)}$-*p*-menthadiene exhibit a remarkable difference in magnetic rotation, the values of the last being much higher than those of the two former. The author showed that this is due to the presence of two double linkings in the position —C : C.C : C— in the molecule of $\Delta^{3:8(9)}$-*p*-menthadiene.—A difficulty in the theory of valency of W. Barlow and W. J. Pope: D. L. **Chapman.** It is shown that the two propositions regarding the assemblages of spheres made by Messrs. Barlow and Pope imply that a sphere of any size can replace any other without any resort to re-marshalling being necessary, and therefore cannot be used in their present unqualified form to demonstrate that valency is a simple volume relation.—The more exact determination of the densities of crystals: Earl of **Berkeley.** A conical pyknometer with thermometer stopper and graduated side-tube is used, and the evaporation of the liquid is relied on to bring the level in the capillary side-tube within the graduations. The liquid used is carbon tetrachloride.—A relation between the volumes of the atoms of certain compounds at the melting points and their valencies. Interpretation by means of the Barlow-Pope theory: G. **Le Bas.** The molecular volumes of complex paraffins and alcohols can be calculated very exactly by means of the formulæ

$$\text{M. V. of } C_nH_{2n+2} = (6n+2)S = 6nS + 2S,$$

and

$$\text{M. V. of } C_nH_{2n+1}OH = (6n+4)S = 6nS + 4S,$$

where S is a constant which has an average value of 2·970, and is called the unitstere.—The action of acid chlorides on thioureas: A. E. **Dixon** and J. **Hawthorne.** —3-Hydroxyphthalic and 3-methoxyphthalic acids and their derivatives: W. H. **Bentley,** Miss R. **Robinson,** and C. **Weizmann.**—4-Hydroxyphthalic and 4-methoxyphthalic acids: W. H. **Bentley** and C. **Weizmann.**—Derivatives of naphthacenequinone: W. H. **Bentley,** A. **Friedl,** F. **Thomas,** and C. **Weizmann.**—Dithioxanthoxalanil (preliminary note): S. **Ruhemann.**

PARIS.

Academy of Sciences, December 31, 1906.—M. H. Poincaré in the chair.—M. H. Becquerel was elected vice-president for the year 1907.—Self-recording apparatus for the solar atmosphere: H. **Deslandres.** After giving an account of the essential conditions of the problem, the author discusses in detail the various methods possible, mentioning those already applied in different observatories. It is pointed out that the more modern patterns differ both in movements and dimensions from the older forms. Five diagrams accompany the paper.—The observations of nebulæ made at the Paris Observatory: G. **Bigourdan.** —A method of measuring the resistance opposed by metals to rapid deformations: P. **Vieille** and R. **Liouville.** A law connecting the deformations of crushers used in ballistic experiments in the two cases—slow deformations, as in calibration, and deformation at varying velocities.—A butyric lactone and unsymmetrical dimethyl-butylene glycol: Louis **Henry.** Butyrolactone, treated with magnesium methyl bromide or iodide, gives the glycol

$$(CH_3)_2(OH)—CH_2—CH_2—CH_2.OH,$$

in about 50 per cent. yield. The glycol reacts with acetyl chloride, giving the chloroacetin

$$(CH_3)_2—CCl—CH_2—CH_2—CH_2Ac.$$

—The conductibility accompanying the expansion of gases: L. **Bloch.** The electrical effects due to the expansion of compressed air and oxygen are comparable, both being due to ions of fairly large mobility present in practically equal amounts. The effects are very irregular, and the mean of a large number of experiments is required to obtain trustworthy results.—Remarks on the thermodynamics of non-homogeneous mixtures: Emil **Bose.** The Duhem-Margules equation may be deduced in a simple manner from a formula given by Nernst for the thermal effects of the mixture of two liquids. The author applies this to the case of two non-miscible liquids.—A new manganese silicide: G. **Gin.** The new silicide has been obtained by the reduction of rhodonite in the electric furnace. The composition corresponds to the constitution Si_2Mn_3. Its physical and chemical properties are described.—The solubility of carbon in manganese sulphide: M. **Houdard.** Carbon dissolves in fused manganese sulphide in quantity proportional to the time of heating, the maximum solubility being 3·2 per cent. The carbon is recovered from the ingot in the form of graphite, it being indifferent whether amorphous carbon or diamond is originally added. The manganese sulphide is not reduced.—The density of gaseous hydrochloric acid; the atomic weight of chlorine: Ph. A. **Guye** and G. **Ter-Gazarian.** An outline is given of the methods adopted for obtaining the gas in the pure state and measuring its density. The mean weight of a litre of HCl at 0° C., under one atmosphere pressure, latitude 45°, at the level of the sea is 1·6398 grams. The molecular weight of the gas has been calculated by the method of reduction to 8° C. of the critical elements. The atomic weight of chlorine thus derived is 35·461, agreeing well with the figure of Dixon and Edgar (35·463) or the value (35·460) deduced from the ratio Ag : Cl for Ag (107·89). As the experiments are preliminary, the authors do not wish to lay too much stress on the exactitude of the coincidence.—The melting points of the homologous hydrocarbons of the methane series: D. E. **Tsakalotos.** An empirical formula is given by means of which the melting points of the hydrocarbons between $C_{16}H_{34}$ and $C_{60}H_{122}$ have been calculated. The agreement between the figures thus calculated and those actually observed is, with one exception, very close, the deviations being less than the experimental error.—The study of the influence of radicals on the character of the complementary valencies of oxygen: M. **Tchelinzef.** An experimental study of the thermal changes which take place on the addition of one or two molecules of ether to various organomagnesium compounds in benzene solution.—The condensation of hydrazines with acetylenic nitriles. A general method for the synthesis of the pyrazolonimines: Ch. **Moureu** and I. **Lazennec.** Hydrazines combine directly with acetylenic nitriles, and it is shown that the resulting compound is cyclic, most probably a pyrazolonimine. The reaction is general, and several examples are given of its application. —The transposition of hydrobenzoin; study of the alkylhydrobenzoins and some trisubstituted aromatic glycols: MM. **Tiffeneau** and **Dorlencourt.**—The disease causing bitterness in wines: A. **Trillat.** Evidence is given in support of the view that the bitterness in wine is due to the presence of an aldehyde resin.—The cultural changes brought about in tubers of Solanum: Édouard **Heckel.** An account of the effects produced on several wild species of Solanum by excessive manuring.—Some attempts at grafting in the Solanaceæ: Ed. **Griffon.** In the experiments described grafting has had no specific morphological influence on either the graft or the plant.—The production of a new variety of maize by traumatism: L. **Blaringhem.** Mutilation constitutes a very powerful means for determining sudden variations, both hereditary and progressive, in plants.—Researches on the cultivation of asparagus in the Auxerrois: Eug. **Rousseaux** and Ch. **Brioux.**—The existence of lymphoid formations producing blood corpuscles in the Gammaridæ: L. **Bruntz.**—A new antelope from Central Africa, *Cephalophus leopoldi*: Maurice **de Rothschild** and Henri **Neuville.**—The influence of a small quantity of the radium emanation on the development and metamorphosis of batrachians: P. **Wintrebert.**—A comparison of sleep during the day and night: N. **Vaschide.** Sleep during the daytime is in all cases less profound, less restful, and less refreshing than sleep during the night.—The treatment of malignant pustule by iodine: A. F. **Llobet.**—The *charriage* of the northern slopes of the Pyrenees between the valley of Ariège and Roussillion: Léon **Bertrand.**—Some early experiments of M. Daubrée and of M. de Chancourtois relative to the artificial imitation of mountain chains: Stanislas **Meunier.**

DIARY OF SOCIETIES.

THURSDAY, January 10.

Mathematical Society, at 5.30.—Exhibition of Four-dimensional Models: Mrs. A. Stott.—On the Uniform Convergence of Fourier's Series: Dr. E. W. Hobson.—Asymptotic Approximation to Integral Functions of Zero Order: J. E. Littlewood.—Partial Differential Equations of the Second Order having Integral Systems free from Partial Quadratures: Prof. A. R. Forsyth.—On the Singular Points of Some Classes of Power Series in Several Variables: G. H. Hardy.—The Construction of the Line drawn through a Given Point to meet Two Given Lines: Prof. W. Burnside.—On the Reducibility of Covariants of Binary Quantics of Infinite Order, Part iii.: P. W. Wood.—On Hypereven Numbers, and on Fermat's Numbers: Lieut.-Col. A. Cunningham.

Institution of Electrical Engineers, at 8.—New Incandescent Lamps: J. Swinburne.

FRIDAY, January 11.

Institution of Civil Engineers, at 8.—The Balancing of Internal-combustion Motors applied to Marine Propulsion: A. T. Weston.

Royal Astronomical Society, at 5.—Observation of the Occultation of Saturn by the Moon, 1906, October 27: John Tebbutt.—The Places of Zodiacal Stars for the Epoch 1900: A. M. W. Downing.—The Perturbations of Halley's Comet: P. H. Cowell and A. C. D. Crommelin.—Micrometrical Measures of Double Stars: Rev. T. E. Espin.—New Double Stars: Rev. T. E. Espin.—Observations of Occultations of Stars by the Moon made in the Year 1906: Royal Observatory, Greenwich.—*Probable Paper*: Mean Areas and Heliographic Latitudes of Sun-spots in the Year 1905, Deduced from Photographs taken at the Royal Observatory, Greenwich, at Dehra Dûn, at Kodaikánal Observatory, India, and in Mauritius (communicated by the Astronomer Royal).—*Probable Discussion*: Prof. Fowler's Papers on the Enhanced Lines of Iron in the Region F to C, and on Silicon in the Chromosphere.

Malacological Society, at 8.—Descriptions of New Species of Achatina from the Congo Free State: S. I. Da Costa.—Further Contributions to the Genus Chloritis, with Descriptions of Eleven New Species: G. K. Gude.—Description of a New Species of Papuina, and Illustrations of some hitherto unfigured Helicoid Land-shells: G. K. Gude.—Descriptions of new Non-marine Shells from New Zealand: Henry Suter.

SATURDAY, January 12.

Royal Geographical Society (at The Queen's Hall, Langham Place), at 8.45.—The Duke of the Abruzzi's Expedition to Mount Ruwenzori.

Public School Science Masters' Association (University of London), at 2.30.—The Place of Science and of Literature in a General Education: Rev. and Hon. E. Lyttelton.—The Internal Economy of School Science: Mr. Thwaites.—The best Method of Introducing the Atomic Theory in Science: F. R. L. Wilson.

MONDAY, January 14.

London Institution, at 5.—The Wonder Workers of the Soil: Prof. W. B. Bottomley.

TUESDAY, January 15.

Royal Institution, at 3.—The Sculpture of Aegina in Relation to Recent Discovery: Prof. Percy Gardner.

Zoological Society, at 8.30.—On a Collection of Mammals made by Dr. Vassal in Annam: J. Lewis Bonhote.—On the "Bleating" or "Drumming" of the Snipe (*Gallinago coelestis*): P. H. Bahr.—Some New and Insufficiently-known Species of Marmoset Monkeys from the Amazonian Region: Dr. E. A. Goeldi.—Contributions to the Knowledge of the Systematic Arrangement and Anatomy of Certain Genera and Species of Squamata: F. E. Beddard, F.R.S.

Royal Statistical Society, at 5.

Society of Arts, at 4.30.—The Progress of the Uganda Protectorate: George Wilson, C.B.

Faraday Society, at 8.—The Application of the Electron Theory to Electrolysis: E. E. Fournier d'Albe.

WEDNESDAY, January 16.

Society of Arts, at 8.—Adjourned Discussion on Mr. J. W. Gordon's Paper, Patent Law Reform.

Royal Microscopical Society, at 8.—President's Annual Address, The Flowering Plants of the Mesozoic Age in the Light of Recent Discoveries.—Exhibition of Mounted Specimens of Freshwater Polyzoa: Mr. Rousselet.

Meteorological Society, at 7.45.—Annual General Meeting.—Presidential Address, Weather in War Time: Richard Bentley.

THURSDAY, January 17.

Royal Society, at 4.30.—*Probable Papers*: Regeneration of Bone, Part ii.: Sir William Macewen, K.C.B., F.R.S.—Further Observations on the Effects Produced in Rats by the Trypanosomata of Gambia Fever and of Sleeping Sickness: H. G. Plimmer.—The Natural and Induced Resistance of Mice to the Growth of Cancer: Dr. E. F. Bashford, J. A. Murray, and Dr. W. Cramer.—On the Pathology of the Dropsy produced by Obstruction of the Superior and Inferior Venæ Cavæ and the Portal Vein; Preliminary Communication: Dr. C. Bolton.—Experiments on the Dark Space in Vacuum Tubes: Sir William Crookes, F.R.S.—On the Discharge of Negative Electricity from Hot Calcium: Dr. F. Horton.

Chemical Society, at 8.30.—The Relation between Absorption Spectra and Optical Rotatory Power, Part i., The Effect of Unsaturation and Stereo-isomerism: A. W. Stewart.—Organic Derivatives of Silicon, Part ii., The Synthesis of Di-ethyl, Propyl Benzyl Silicol, its Sulphonation, and the Resolution of the Sulphonic Derivatives into Optically Active Compounds: F. S. Kipping.—The Association of Phenols in the Liquid Condition: J. T. Hewitt and T. F. Winmill.—A New Mercuric Oxychloride: J. T. Hewitt.—Aromatic Selenonium Bases: S. Smiles and T. P. Hilditch.—The Relation of Colour and Fluorescence to Constitution: A. G. Green.—The Constitution of Silver Nitrite, a Correction: E. Divers.—Preparation of Chromyl Chloride: F. D. Law and F. M. Perkin.—Tetraketopiperazine: A. T. de Moulpied and A. Rule.

Royal Institution, at 3.—Recent Advances in the Exploration of the Atmosphere: Dr. W. N. Shaw, F.R.S.

Linnean Society, at 8.—*Platanthera chlorantha*, Custor, var. *tricalcarata*: W. Botting Hemsley, F.R.S.—Acanthacea of Insular Malaya: the late Mr. C. B. Clarke, F.R.S.—A Freshwater Isopod from Calcutta: Rev. T. R. R. Stebbing, F.R.S.

FRIDAY, January 18.

Royal Institution, at 9.—Fifty Years of Explosives: Sir Andrew Noble, Bart., K.C.B., F.R.S.

Institution of Mechanical Engineers, at 8.—Adjourned Discussion on Lighting of Railway Premises, Indoor and Outdoor: H. Fowler.—Eighth Report to the Alloys Research Committee: On the Properties of the Alloys of Aluminium and Copper: Prof. H. C. H. Carpenter and C. A. Edwards.

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